

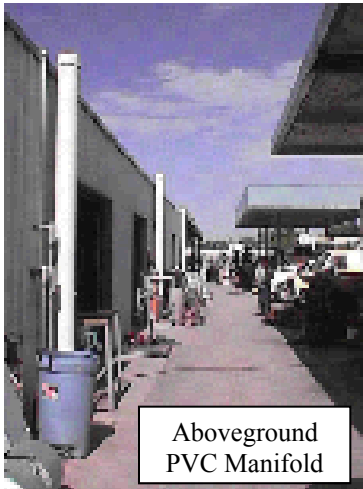
5.0 RODGERS DRILLING SITE – 2615 ISLETA BOULEVARD SW NMED Facility Number 11017001

5.1 INTRODUCTION/SITE HISTORY

Based on a comprehensive review of available historical data, past Site knowledge, and completion of a detailed site inspection, FEI/TPA completed the following site summary. In addition, detailed maps were constructed summarizing known Site conditions and are presented as Figures 5A and 5B.



- Hydrocarbon releases were first identified at the Site in the 1980's during removal of the former USTs (Figure 5A). Based on limited laboratory analysis of soil samples, both gasoline and diesel fuels were released at the Rodgers Site.
- Shallow ground water flow has been calculated to flow south-southeast at a gradient of approximately 10^{-4} ft/foot. Depth to ground water is approximately 7 to 8 feet below ground surface (bgs). Site geology is poorly characterized, however, it appears to be primarily composed of sands with lesser amounts of silts and clays.
- The property immediately north of the Site was previously the location of Sparkle Car Wash. Gasoline hydrocarbon releases have been documented from former USTs at the Sparkle Site (Figure 5A). Excavation and disposal of a large portion of the soils in the tank pit and long-term monitoring by the responsible party suggest that the Sparkle plume is relatively restricted in size, is partially remediated, and has not co-mingled with the adjacent Rodgers plume.
- Investigation and remediation activities have been conducted in two primary episodes at the Rodgers Site. Initially, Metric Corporation (Metric) was retained by the responsible party. In 1990, Metric installed a series of shallow completion monitor wells in the Site vicinity which identified a large dissolved-phase BTEX and MTBE hydrocarbon plume with localized phase separated hydrocarbons.



- In 1991 Metric, on behalf of the responsible party, installed a passive vadose zone aeration system in the vicinity of the former tanks (Figure 5A). This system involved excavation of six approximately 45 to 50 foot long trenches extending to the water table. Slotted PVC well screen was set horizontally in these trenches and manifolded to aboveground wind turbines. The trenches were then backfilled with sand and gravel and an asphalt cap applied. Additionally, approximately 150 cubic yards of impacted soils were reportedly removed from the former UST location.

- In 1992, NMED included the Rodgers Site on its list of GWPA State Lead remediation projects. NMED retained Billings and Associates, Inc. (BAI) to evaluate site conditions and design and implement an enhanced remedial strategy. As part of an abbreviated investigation BAI advanced and sampled a series of 12 soil borings along the northern and southern margins of the Rodgers property. Soil boring logs could not be located in the NMED case file. Limited PID and TPH analyses were conducted on retrieved soil samples, the results of which are shown in Figure 5A.

- Apparently three primary soil hydrocarbon source areas are present in the Site vicinity; one located at the Sparkle Site and two others located at the Rodgers Site. It is possible, due to the limited soil TPH data, that the two apparent Rodgers soil plumes actually connect beneath the building as a single larger plume.
- BAI subsequently installed an in-situ AS/VE remediation system that consists of two primary lines of sparge and vent wells, which are shown in Figure 5A. A line of 20 sparge/vent well clusters are located at approximately 19-foot intervals along the south side of the Rodgers building and an additional line of 7 well clusters are located along the north side of the Rodgers property. Evidence of the northern line of wells was identified in the field. The exact location of the southern line of wells could not be ascertained as all components are buried. Based on the scale and generalized nature of the BAI site map, it is unclear whether the southern line of wells is inside or outside of the fencing along the Rodgers/AutoZone property boundary. Discussions with Rodgers' personnel also failed to determine the exact location of the southern line of wells.
- According to the BAI reclamation system as-built report (1992), vent wells were constructed via hand auguring techniques using 2" diameter schedule 40 PVC with a single foot of 0.01"-slot screen set from approximately 3 to 4 feet bgs. Approximately 0.5 feet of bentonite seal is emplaced from approximately 2.5 to 3.0 feet bgs. Sparge wells were reportedly installed by hand-auguring a 4" diameter borehole to the static water table at approximately 7-8 feet bgs. 1.5" diameter casing with a single foot of well screen set at the base was then driven to a total depth of approximately 15 feet bgs.

An approximately 1-foot thick bentonite seal was set in each sparge well borehole annulus at the water table followed by backfill of unknown origin.

- Sparge and vent wells are manifolded via below grade and above-grade 2" diameter schedule 40 PVC piping to several small VE and AS blowers housed in the northwest corner of the Rodgers Site (Figure 5A). Examination of the above ground piping indicates it is in poor condition (see photo). The condition of the blowers could not be ascertained as the storage buildings originally housing the blowers were locked.
- The AS/VE system was operated for approximately 3 years prior to shutdown. Laboratory TPH and BTEX samples were not reported from the off-gas stack emissions throughout this period. However, samples were analyzed using a PID. Maximum PID readings on vapors recovered from the southern leg of the system reportedly did not exceed 10 ppm/v. The northern leg was located nearer the source area and yielded off-gas PID concentrations of greater than 700 ppm/v during initial system operation. Overall maximum combined stack emissions were initially reported as high as 1700 ppm/v. Total hydrocarbons removed from the Site are unknown.
- BAI documented reductions in BTEX and MTBE concentrations in on-site monitor wells. However, re-sampling of select ground water monitoring wells in 1998 following shutdown of the reclamation system identified increased BTEX concentrations in several wells. It should also be noted that monitor well W-4 has been lost or destroyed and was previously the most contaminated well at the Site.



5.2 EXISTING SITE CONDITIONS

Based on the above data, the following deficiencies need to be addressed:

- Site lithology and the magnitude and extent of hydrocarbon contamination have never been fully characterized at the Site. Many of the original monitor wells are silted up or dry and unusable.
- Engineering analysis indicates the use of 2" diameter PVC piping for all manifold lines throughout the system results in significant head flow losses in medial to distal wells. Horizontal distances from the blowers to the distal wells are over 500 feet in length. These distances, combined with the use of low horsepower regenerative blowers, will limit system effectiveness. Furthermore, horizontal piping was never pressure tested and was reportedly buried at only 18" bgs. It is likely that in many of the higher traffic areas, piping has been crushed due to heavy traffic loading.

- Vacuum short-circuiting in the subsurface is likely to be a significant problem at the Site both from the Metric-designed system and from possible improper backfilling of soil borings in the same general location as the AS/VE wells.
- None of the VE wells are manifolded for individual operation. System operation with all wells turned on likely creates “dead zones” in many areas of the Site where little or no remediation is occurring.
- It is likely that the hydrocarbon source area has not been fully remediated. The re-emergence of benzene at high concentrations in monitor well W-11 confirms this hypothesis.

5.3 RECOMMENDED ACTIONS

Task One – Site Review and Work Plan Development

This task provides for the review of NMED/USTB files, site mapping and photography, review of historic ground water and soils data, and final preparation of this work plan for additional investigation.

Task Two – Sample Existing Wells and Conduct Three Additional Quarterly Sampling Rounds

Ground water in all usable wells (eighteen existing wells) will be sampled during an initial event for organic parameters including BTEX, MTBE, EDC, EDB, and naphthalene using EPA Method 8260. The following natural attenuation indicators will also be sampled for using field test kits: dissolved oxygen (DO), nitrate (NO₃), dissolved and total iron (Fe), alkalinity (HCO₃/CO₃), phosphate (PO₄), and sulfate (SO₄). Additional field tests will include pH, temperature, and conductivity. FEI/TPA will provide NMED/USTB and BCEHD 48-hour notification prior to initiating any sampling.

We also propose three additional quarters of groundwater sampling for BTEX, TMB, EDB, EDC and MTBE using EPA Method 8021 (EDX) and for the above natural attenuators. We propose sampling 12 wells in the second quarter, 15 wells in the third quarter and 12 wells in the fourth quarter.

During each sampling event, groundwater levels will be measured prior to sampling. Collected data will be used to define drilling locations as needed in Task Three below. New locks and well caps will be installed on all usable monitoring wells. Quarterly reports will be submitted according to the requirements of USTR §1216.

Task Three - Hydrogeologic Investigation

General – FEI/TPA will characterize the magnitude and extent of soil and ground water contamination in the Rodgers Site vicinity through advancement and sampling of soil borings and monitor wells. Tentative drilling locations are shown in Figure 5B. Off-site access will be required for several drilling locations. For the purposes of cost estimation and based on a comprehensive review of the Site data we propose the following number of soil borings and wells:

Projected Drilling Activity

- 17 - Soil borings
- 2 - 2" diameter shallow completion monitor wells
- 8 - 4" diameter Multi-Use Monitor/VE wells w/high flow screen (*see below*)
- 1 - 2" diameter deep completion monitor/AS well
- 5 - 1" diameter multiple completion pilot test wells (*see below*)

All soil borings will be sampled on a continuous basis using either 2-foot long split spoons or 5-foot long core barrels. PID headspace analysis will be conducted on retrieved soil samples at five-foot intervals or less and at the water table. One to two laboratory soil samples will be collected from each drilling location and analyzed for TPH (gasoline-diesel range) using EPA method 8015 modified and for BTEX and MTBE using EPA Method 8021. Samples will be collected for gasoline-range compounds using methanol extraction kits and unpreserved 4-oz jars for diesel-range compounds. New ground water monitoring wells installed during this task will be sampled and analyzed for the same EPA 8260 hydrocarbon parameters, natural attenuation indicators and field tests which were described for the initial well sampling in Task 2. Additionally, all new and existing wells will be surveyed to a common USGS (or other) established Mean Sea Level benchmark datum by a NM licensed surveyor.

At the Rodgers Site, we recommend conducting an AS/VE pilot test to evaluate potential remedial alternatives. Site access in many of the proposed drilling locations is a serious logistical problem. For this reason, we recommend many of the new wells be constructed as multi-use 4" diameter wells or 1" diameter pilot test vacuum well clusters to avoid future drilling disruption at the Site and maximize data collection.



Aquifer Hydraulic Properties - Pursuant to the requirements of the USTR Part XII, Section 1210, FEI/TPA recommend evaluation of Site hydrogeologic properties through laboratory testing of retrieved sediment samples. Data collected from these activities will be used to determine grain size distribution, grain and bulk density, specific permeability (k) and effective porosity (n). Hydraulic properties such as storativity, transmissivity (T), and hydraulic conductivity (K) can then be estimated using sediment sample data. This information will then be used to calculate average ground water and contaminant migration rates, which are necessary in risk assessment calculations and/or determination of potential remedial alternatives. We recommend two monitor well locations to collect discrete sediment samples for laboratory characterization. Two samples will be collected from each location; one in the

vadose zone and one in the shallow saturated zone. In addition to the above, two of the samples will also be analyzed for total organic carbon content (TOC).

Task Four - Completion of the Hydrogeologic Investigation (HI) Report

Upon receipt of all field data, FEI/TPA will prepare a summary HI report. This Report will include geologic and contaminant distribution cross sections, isoconcentration maps, a ground water isocontour map, appropriate tables, and text summarizing the results of the investigation as it relates to plume characterization and site remediation, and the requirements of the USTR. In addition, residual hydrocarbon spill mass estimates will be included.

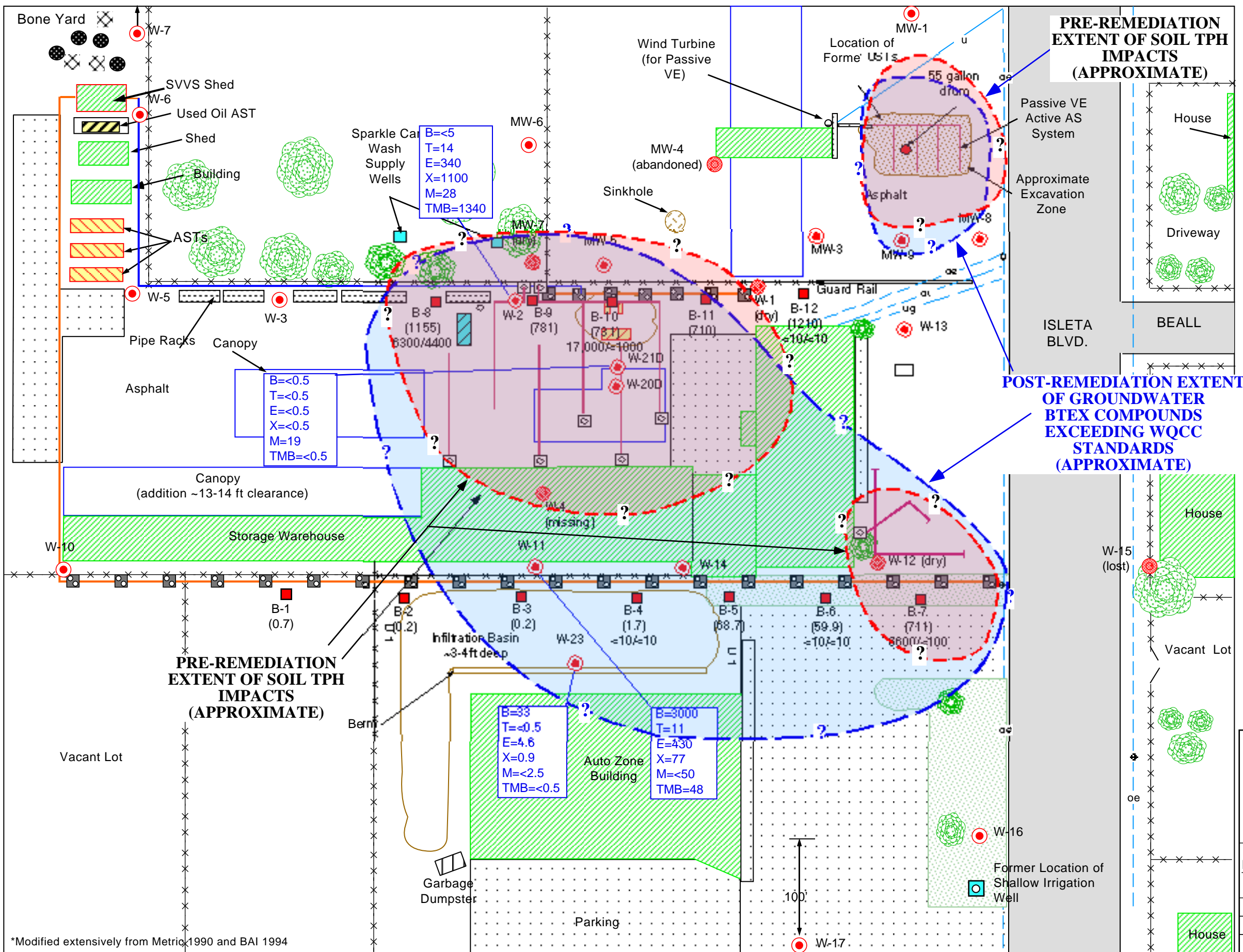
AS/VE Task Five - Conduct AS/VE Pilot Test (Optional)

As discussed above, FEI/TPA recommends the implementation of a short-term AS/VE pilot test to evaluate remedial alternatives, the effects of short-circuiting, well spacing/zone(s) of influence, process water generation vs. applied vacuum, flow and vacuum responses, and off-gas emission concentration and composition. Data collected during the pilot test will be used to aid in design of the final reclamation system.

Due to the many site complexities, the pilot test will be conducted in two primary phases over a two-day period. Phase One will consist of in-situ VE testing on several newly installed high performance 4" diameter wells (see above). In an effort to evaluate the effects of lithologic heterogeneity across the Site and short-circuiting from the previously installed reclamation systems, pilot testing will be conducted at three separate locations. Tentative test wells include VM-3 (primary test well) and VM-8 and VM-9 (ancillary test wells). Using proposed monitor wells in conjunction with strategically placed vadose/phreatic zone 1" diameter monitoring well clusters, will allow measurement of vacuum responses and sparging effectiveness in a three dimensional nature during each portion of the pilot test. It should be noted that the use of pre-existing wells to measure vacuum responses is likely to provide erroneous data as many of these wells were installed as drive-point wells and lack bentonite seals. Phase Two will consist of combined in-situ AS/VE at well locations VM-3 and AS-1.

Phase One will be run for approximately 8 hours; starting with wells VM-8 and VM-9 for approximately two hours each followed by four hours of applied VE at well VM-3. Phase Two will be implemented the following day and consist of operation of VM-3 and initiation of sparging into AS-1 for an approximate 10 hour period. During the Phase Two portion of the test, a tracer gas (helium or sulfur hexafluoride) will be injected into the sparge well at a known concentration. Samples will be collected from the VE well using a field detector to evaluate flow and travel time characteristics at the Site.

During the Phase One and Two portions of the test, six vapor samples will be collected in tedlar bags and sent to the laboratory for TPH and BTEX analysis using EPA Method 8015 modified and 8021. In addition, three samples will also be analyzed for fixed gases and methane using standard EPA methodology.



EXPLANATION:

MW-3 Existing Monitor Well Location

B=Benzene
T=Toluene
E=Ethyl Benzene
X=Total Xylenes
M=(MTBE) Methyl-Tertiary Butyl Ether
TMB=trimethyl benzenes
Laboratory Groundwater Analysis (dbs 1998). All Concentrations in Parts Per Billion (ppb).

Soil Boring Location (BAI, 1994)

B-7 (711) PID Reading (in ppm/v)

6600/<100 TPH as gasoline/diesel

Below Ground SVVS Remediation System Piping

Above Ground SVVS Remediation System Piping

Passive Below Ground Vadose Zone Remediation System

SVVS Remediation Well Nest (Location Approximate)

Building

Concrete

Utility Pole

Fence Line

Trees/vegetation

Underground/overhead Utility

Proposed Soil Boring

Proposed Air Sparging Well

Proposed Dual Completion Pilot Test Well

Proposed 4" Dia. Ve/monitor Well

Proposed 2" Dia. Monitor Well

0 40 ft
Scale

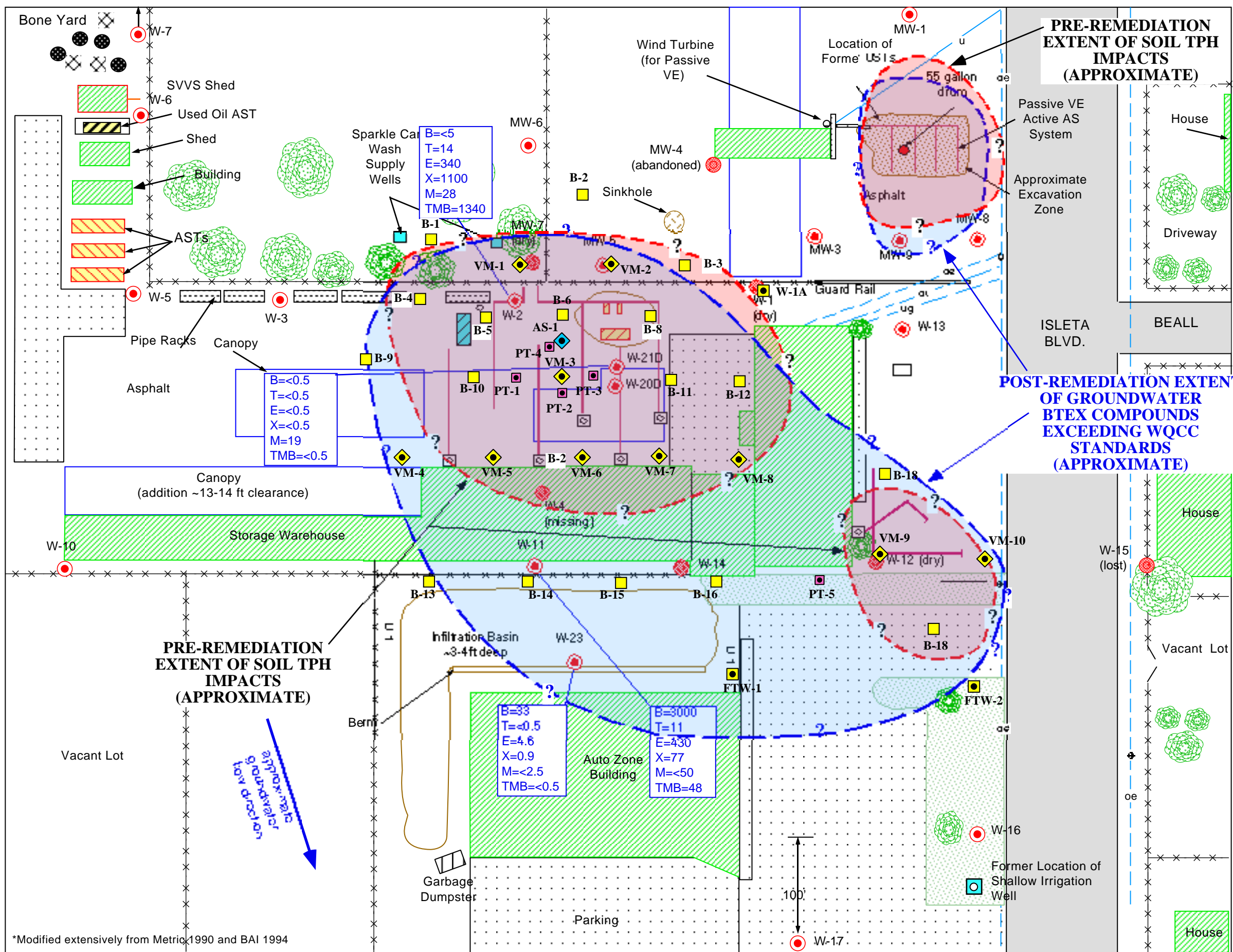
Soil and Groundwater Quality Summary Map
Rodger's Drilling Site
2615 Isleta Blvd. SW
Albuquerque, New Mexico

FEI FAITH ENGINEERING, INC.

TECUMSEH PROFESSIONAL ASSOCIATES, INC.

Drawn by: WJB/CAF*	7/99	Client: BCEHD
Drafted by: ABL	7/99	Job # 035-001
Reviewed by: WJB	7/99	Figure: 5A

*Modified extensively from Metric 1990 and BAI 1994



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Passive Below Ground Vadose Zone Remediation System

SVVS Remediation Well Nest (Location Approximate)

Building

Concrete

Utility Pole

Fence Line

Trees/vegetation

Underground/overhead Utility

Proposed Soil Boring

Proposed Air Sparging Well

Proposed Dual Completion Pilot Test Well

Proposed 4" Diameter Ve/monitor Well

Proposed 2" Diameter Monitor Well

0 40 ft
Scale

Proposed Drilling and Pilot Test Locations
Rodger's Drilling Site
2615 Isleta Blvd. SW
Albuquerque, New Mexico

FEI FAITH ENGINEERING, INC.		TECUMSEH PROFESSIONAL ASSOCIATES, INC.	
Drawn by: WJB/CAF*	7/99	Client: BCEHD	
Drafted by: ABL	7/99	Job # 035-001	
Reviewed by: WJB/SF	7/99	Figure: 5B	

*Modified extensively from Metric 1990 and BAI 1994

12/1/95•BJWR	0	NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — SUMMARY SHEET	
Site Name: Rodger's Drilling		Site Address: 2615 Isleta SW Albuquerque, NM 87105	
Circle only one: <div style="border: 1px solid black; padding: 2px; display: inline-block;">Work plan</div> Claim	Circle only one: Minimum Site Assessment <div style="border: 1px solid black; padding: 2px; display: inline-block;">Phase 1 — Hydrogeo Investigation</div>	Phase 2 — Free Product / Saturated Soil Recovery Phase 3 — Reclamation Proposal	Phase 4 — Reclamation Implementation Phase 5 — Operations and Maintenance
FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5		NMED Use Only	
SUMMARY SHEET		TOTAL	
PROFESSIONAL SERVICES		\$39,430.00	
TAXABLE EXPENSES		\$6,663.00	
TAXABLE SUBCONTRACTORS		\$31,116.75	
TAXABLE SUBTOTAL		\$77,209.75	
NMGR T RATE 5.5625% X TAXABLE SUBTOTAL =		\$4,294.79	
TOTAL		\$81,504.54	
NONTAXABLE EXPENSES			
NONTAXABLE SUBCONTRACTORS			
NONTAXABLE SUBTOTAL			
GRAND TOTAL OF CLAIM		\$81,504.54	

12/1/95•BJWR

NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — PROFESSIONAL SERVICES

Site Name: Rodger's Drilling**Site Address:** 2615 Isleta SW
Albuquerque, NM 87105**Circle only one:**☒ **Work plan** ☐ **Claim****Circle only one:**☐ Minimum Site Assessment☒ Phase 1 — Hydrogeo Investigation☐ Phase 2 — Free Product /
Saturated Soil Recovery☐ Phase 3 — Reclamation Proposal☐ Phase 4 — Reclamation Implementation☐ Phase 5 — Operations and Maintenance

FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5

NMED Use Only

PROFESSIONAL SERVICES	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
initial sampling + 3qtrs gw monitoring					\$12,770.00		
Drilling & Sampling (Hydrogeologic Investigation)					\$11,460.00		
Hydrogeologic Report					\$10,080.00		
Pilot Testing					\$5,120.00		
Site Review							
SUBTOTAL					\$39,430.00		

NEW MEXICO CORRECTIVE ACTION FUND COST DETAIL FORM — EXPENSES

Site Name: Rodger's Drilling

Site Address: 2615 Isleta SW
Albuquerque, NM 87105

Circle only one:

☒ **Work plan** ☐ **Claim**

Circle only one:

Minimum Site Assessment

☒ Phase 1 — Hydrogeo InvestigationPhase 2 — Free Product /
Saturated Soil Recovery

Phase 3 — Reclamation Proposal

Phase 4 — Reclamation Implementation

☐ Phase 5 — Operations and Maintenance

FIXED-PRICE CONTRACT FOR ALL TASKS IN PHASE 1 AND 5

NMED Use Only

EXPENSES	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
NONTAXABLE							
N/A							
NONTAXABLE SUBTOTAL							
TAXABLE							
initial sampling + 3qtrs gw monitoring					\$2,537.00		
Drilling & Sampling (Hydrogeologic Investigation)					\$2,597.00		
Hydrogeologic Report					\$567.00		
Pilot Testing					\$962.00		
Site Review							
TAXABLE SUBTOTAL					\$6,663.00		

Site Address: 2615 Isleta SW
Albuquerque, NM 87105

Phase 5 — Operations and Maintenance

NMED Use Only

SUBCONTRACTORS	Invoice #	Rate	Unit	# of Units	Total	Project Manager	Auditor
NONTAXABLE							
N/A							
NONTAXABLE SUBTOTAL							
TAXABLE							
initial sampling + 3qtrs gw monitoring					\$3,798.90		
Drilling & Sampling (Hydrogeologic Investigation)					\$23,747.85		
Hydrogeologic Report							
Pilot Testing					\$3,570.00		
Site Review							
TAXABLE SUBTOTAL					\$31,116.75		